IT Evaluation Frameworks – Do They Make a Valuable Contribution? A Critique of Some of the Classic Models for use by SMEs

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Abstract: Given the plethora of frameworks and models available in this area, not all could be evaluated here. This paper takes seven popular frameworks and examines aspects of IT evaluation with particular emphasis on Small to Medium Enterprises (SMEs). The frameworks were selected from the most well known of IT evaluation research including Delone and McLean, 1992, Seddon et.al. 1999, Farbey et.al, 1999, Levy et.al., 1998. Most of the frameworks were developed for large organisations and therefore those chosen were evaluated for their applicability to the world of SMEs. These are categorised into four areas: people issues, technology focus, evolutionary position and management aspects. The conclusion is reached that the use of a multi-framework is needed for all organisations. This presents severe difficulties in larger organisations, as the problems of communications can be a stumbling block to completing the evaluation. However, this paper proposes that SMEs may find it easier to take parts of 'tested' frameworks used by larger companies and apply them. The communication links within SMEs are neither as complex nor as highly developed as in large organisations that may make this an appropriate approach.

Keywords: IT evaluation, IT Value, SMEs, frameworks, models.

1. Introduction

Thornton (1997) states that when it comes to measuring the value of IT that the commercial world is split into three, those that view under-performing IT investments as a problem; those that view under-performing IT investments as a defining condition of the complex world we live in and those that are in denial that IT moneys are not being wisely spent. This at least tells us that there is a major problem as far as defining the value of IT investment is concerned. Large organisations have for many years wrestled with the problem of evaluating their IS / IT and attempting to justify the implementation of the latest project to the Finance Director. So far they have had very little success in this area. The most lasting observation is that it is *not* possible to cost the total impact of an IT project. Researchers have also brought vast amounts of methodologies, frameworks, models and discussions to the debate. A review of IT value articles (Chan, 2000) provides strong evidence of a schism between the use of quantitative and qualitative measures in IT-value research. There is a real need for a framework that encompasses all of the aspects recognised as relevant in the "Great Information Systems Benefit Hunt" (Farbey et. al., 1993). Many Information Systems (IS) researchers have turned their attention in recent years to study SMEs and their use of IT (Ballantine, 1998, Dans, 2001, Kingswell,1999, Levy et. al., 1998). SMEs form a very important part of UK and European business and have the ability to impact in a major way on customers and suppliers.

IS theorists believe that IT investment should be made in the context of IS / IT strategy and should support business strategy (Galliers et. al., 1987). However SMEs generally lack strategic planning as a management tool (Anderson and Lawrie, 2001) and this alone will have a major impact on their decisions. The tendency in most SMEs is to view IT investment as a cost (Levy et. al., 1998) and to expect it's application to reap short-term benefits with little thought to long-term value. Levy and Powell (1999) found that only one SME in a survey of twenty-five demonstrated that IT /IS can add value in the same way as in larger organisations. At one end of the scale very little use is made of strategic information from Information Systems (IS) in SMEs, whilst some recent start up companies are totally dependent on IS for their existence. Levy et. al., (1998) claim that IT investment in the latter can be very high initially, but then declines as the lack of resources prevalent in all SMEs become apparent. In the study it was shown that industry sector had no impact on the findings. Should SMEs measure the effect of IT at all? There are those who believe that there is little point as many of the benefits are so intangible as to be incalculable. SMEs in particular tend to believe that technology will improve matters and do not always address the process improvements, trying instead to automate

Reference this paper as:
Costello P, Sloane A and Moreton R (2007) "IT Evaluation Frameworks – Do They Make a Valuable Contribution? A Critique of Some of the Classic Models for use by SMEs" *The Electronic Journal Information Systems Evaluation* Volume 10 Issue 1, pp 57 - 64 , available online at www.ejise.com

the existing ones. Remenyi et. al. (1991) state that the search for the 'IT effectiveness metric is the modern day equivalent of the Holy Grail', Ryan and Harrison (2000) and Dans (2001) echo this**.** Remenyi (1991) postulates that as organisations reach higher levels of maturity in their use of IT, evaluation becomes increasingly more important to senior managers. Many SMEs have yet to reach that level of maturity. Most SMEs are looking for short-term improvements to operational performance. They lack "the ability to strike a balance between long-term development and short-term operational pressures" (Anderson and Lawrie, 2001).

Socio-technical factors are an important part within the more widely accepted evaluation frameworks. Many researchers (Brynjolfsson and Hitt, 1996) have called for additional research to identify "hidden costs and benefits" that are not necessarily included in the traditional evaluation methods that are used to investigate the correlation between IT Investment and business performance. The majority of frameworks developed in recent years have come to recognise the importance of taking a socio-technical perspective (Strassman, 1988, Remenyi et. al., 1991, Willcocks, 1994, Bannister and Remenyi, 2001). Research carried out by Jackson and Sloane (2006) has shown that organisational culture and human resources have a major impact on the adoption of new systems and are therefore included in their new model for e-commerce adoption.

2. Categorisation of frameworks

This short analysis is based on preparatory work for a PhD study and practitioner assessment made during work carried out by the authors on 4 projects with SMEs in the West Midlands (WM), a project with SMEs from diverse sectors across the Shropshire Marches area of the UK and two years working on secondment within the WM ICT Cluster of SMEs. Seven frameworks were examined for their pertinence and usefulness for SMEs. The frameworks chosen were those that appear the most frequently in IS research and in IS education in this area. It is apparent from the literature that most frameworks have a particular focus. It was therefore decided that the most appropriate method of analysis was classification. Although many of the frameworks include elements from more than one of the chosen classifications the frameworks are discussed in the light of their main focus. Therefore although they may relate to other categories this has largely been ignored for this study to aid clarification. The focal points have been divided into four categories: People Issues, Technology, Management and Evolutionary Position. Later frameworks have attempted to link the various aspects into new frameworks for example Farbey et.al.'s (1999) IT Benefits Evaluation Ladder, attempts to link strategy and system implementation guidance. Seddon et. al. (1999) realised that the emphasis of many frameworks was on the 'system' and has attempted to link the individual stakeholder role in evaluation and the system evaluation.

2.1 Categories:

2.1.1 Technology

Technology is at the heart of IT evaluation and most frameworks are designed to evaluate the benefits of an IS or a defined aspect of a system. More recent frameworks have started to include the term 'technology' or 'IT' (Farbey et.al., 1999). Many SMEs do not see the 'system' or IT as separate entities. Therefore, technology will be a reference to any hardware, software or telecommunications that the organisation uses to conduct business or support business activities.

2.1.2 People issues

People issues are often at the forefront of the 'softer' benefits and dis-benefits discovered by many researchers. They are important whatever the size of the organisation and also the most expensive resource; but have a particular impact on SMEs who are resource deficient. No evaluation framework analysis would be complete without recognition of this particularly difficult area. The importance of the stakeholder in the evaluation method used and the benefits discovered have also been highlighted (Seddon et. al.1999).

2.1.3 Evolutionary position

Nolan's (1973) 'Stages of Growth model' formed the basis of debate and research over many years, but is now widely adopted and accepted by academics and practitioners, particularly following the development of further models in this area (Earl, 1983, Galliers and Sutherland, 1994). Many organisations can be at many levels of an evolutionary growth cycle, with different applications, at different times. This area is so inextricably linked with strategy that it is imperative. SMEs lack any emphasis on strategy, a framework that enables them to position themselves on the evolutionary 'ladder' aids them in also deciding where they want to be.

2.1.4 Management

SMEs and in particular owner/ managers do not place any emphasis on 'managing' their company (Costello and Reece 2005). Those who work with SMEs experience difficulty when attempting to relieve owner-managers from actually 'doing' the work, when real benefits could be achieved by just managing the company. Yet the performance and growth of SMEs is highly dependent on the competence and capabilities of its managers (Kingswell, 1999). Most SMEs grow under their own momentum until they reach a plateau of maturity when they either stagnate and struggle financially or with appropriate advice they develop, compete and mature. Management is important to a SME for this reason alone. Most organisations will place more emphasis on one of these aspects over another. It was found that large organisations may view frameworks and models in a number of different ways. These were categorised in order of importance:

- Evolutionary Position
- People Issues
- Management
- Technology

Giving the most emphasis to evolutionary position, asking are we at a stage in development when we can cope with this? Do we have the necessary skills? The justification for this is that the larger the organisation the more likely they are to address strategy (Galliers, 1991) and the less important the problems of the technology become as they may already have the skills needed for the implementation. The higher up the evolutionary ladder an organisation is the more likely they are to see the technology playing a supporting role to the business environment (Farbey et.al., 1999). SMEs, however, are more likely to prioritise them in the following manner:

- Technology
- People Issues
- Management
- Evolutionary Position

The cost and the problems of implementing the technology itself and the immediate associated problems are likely to be high on the SME list of priorities. They rarely have the expertise to cope with implementation alone and are also very dependent on outside consultants for help with their choice of technology. It is often only with hindsight that an attempt is made to make the technology ‘fit’ the organisational requirements (Costello et.al., 1999). Evolutionary position in SMEs is largely ignored as strategy is rarely considered (Dans, 2001). There are frameworks that do not fit easily into this classification system and there are aspects that are outside the realm of these four areas. However, as the analysis is from a SME perspective it has been significantly simplified to reflect the simpler structure in small companies.

3. Analysis of frameworks

Farbey et. al. (1993) uses Mintzberg's (1983) ‘Structure in Fives' adapted to reflect the various organisational structures and their impact on an IT project. The original model was developed by concentrating on the purposes of each of these parts and meshing that with the purpose of any new IT implementation and how that affected Mintzberg's people structure. The framework allows for an organisation wide view of benefits. The intention in the framework is for organisations to examine individually the various parts of the organisation and select aspects of the framework that are appropriate to them. Then to use them to help formulate the questions to discover, manage and predict the outcomes and as a result measure the benefits associated with new IT / IS implementation. The ability to select individual parts, makes elements of this framework helpful for a SME, however, there are also aspects, which are not. Depending on the size of the SME many of the benefits listed will not be seen, for example: 'flatter organisation or reorganisation of the management structure’. Some benefits the framework enables to be predicted would be viewed as advantageous whatever the size of the organisation. The Strategic prediction: 'improved strategic link to customers including: speed and effectiveness of response, customer's access to the company's database and retrieval facilities' (Levy and Powell, 1999) has become a reality for many organisations with the growth of the Internet as a tool for this method of transaction, where EDI may have failed. This framework gives the ability to consider the benefits of IT taking an organisational perspective. Many SMEs do not take this view and are often locked into a continuous round of what they see as step-wise improvements, when they are merely perpetually playing 'catch-up'. The 'people' elements of the impact are often more relevant to SMEs than larger organisations as there are fewer people resources. This means that if one person is unhappy with the introduction of new IT or new processes it can have larger repercussions. The consequence of these repercussions would be relatively greater.

Seddon et. al. (1999) developed an IS effectiveness matrix based on a critique of Delone and McLeans' (1992) IS Success Model which, although distinguishing between individual and organisational impact, does not go far enough and only looks at evaluation of IT from the 'system'

perspective. The discussion postulates that when different individuals evaluate a system they do so on behalf of different stakeholders and therefore different results are obtained. The matrix developed allows the classification of 30 different dimensions of measurement of IT evaluation. Criticisms include the observation that although this research is a valuable contribution to the literature there is no space in the matrix for combining the business processes with the use of IT which is often so inextricable linked as to be difficult to evaluate separately. There may be an argument that although the classification may help in designing the valuation process, without evaluating the business processes it supports, no true value can be realised. However, the matrix is relatively simple to use, as there are comparatively fewer stakeholders within the SME situation. Some parts of the grid may be superfluous but it does allow simple diagnosis of an appropriate method to use depending on the technology to be used and the stakeholder involved. The matrix will also allow for identification of the type of system to be implemented and then classification of the stakeholder. This will avoid wasting time searching for benefits that have the wrong significance. Its main use for a SME is as a timesaver in identifying who and what is involved in the evaluation. In most SMEs if a 'quick and dirty' fix is required to justify expenditure this matrix would appropriately identify the emphasis that may be placed on the evaluation to give the results that are 'perceived' as being justified and often the perceived success is the only conclusion that is required (Powell, 1992).

Delone and McLean (1992) developed the IS Success Model from the recognition that there is a need to measure the success of an IS implementation and also a responsibility to measure its impact on business performance. There is acknowledgement that there are others areas outside of the model e.g. organisation strategy, but it is still widely accepted. They recognised that there is a difficulty in separating out the impact of IT on business performance from other factors. To the criticisms in the literature could be added the premise that it does not take into account any IT technology that may pre-exist the implementation that may also have an impact on the new IS itself. However, in spite of criticisms it has also been widely used for empirical research (Ballantine et. al., 1996). The framework has been developed a number of times (Kennerley and Neely, 1998, Seddon and Kiew, 1996) and more recently minor adjustments by the authors themselves (Delone and McLean, 2003). Another criticism highlighted by the literature is that it does not take into account any external variables for example: the environment. There is room for interpretation of the six main categories and the results will be dependent upon this interpretation. It does however show us how IT/IS can impact on business performance. The model is intended (as many) to evaluate one specific IS but could easily be used to evaluate IT infrastructure or used by a SMEs. Seddon and Kiew (1996) recognised that because IS success means many things to many people that if a single measure of IS success is required, User Satisfaction, as defined in the Delone and McLean model, is ideal as a general-purpose *perceptual* measure of IS success. It may however be argued that as many SMEs margins are very small they cannot afford the 'luxury' of using a measure as ethereal as this. That User Satisfaction does not come into the equation, as users must just 'learn to like it'. Porter's (1984) model is arguably the most well-known business model used for identifying value and costing benefits that create and sustain an organisation's competitive advantage. The value chain is intended for use both to help formulate strategy and develop the steps required to implement that strategy. However, strategy formulation is known to be underdeveloped in SMEs (Dans, 2001) and yet research by Andersen (2001) shows that there is a direct link between strategic planning and business performance. The value chain has been used in numerous scenarios to produce a cost advantage and this alone is an incentive for SMEs as most cite cost cutting as the main reason for new IT projects.

Porter (1984) has already identified that using generally available technology will not give an organisation a competitive advantage, yet SMEs are often several stages behind in their use of IT. The value chain could allow SMEs to conduct comparative analysis within their industrial sector. As using the value chain requires them to identify value activities in great detail and seek out new ways of gaining (or sustaining) competitive advantage. Using the value chain to identify activities can help SMEs to identify those activities that involve IT and can therefore help with decisions with regard to where IT can be upgraded / replaced / introduced. Kaplan and Norton (1992, 1993 and 1996) developed the Balanced Scorecard (BSC) to try to address the growing need for more than financial measures of business success. Their discussion relates to the fact that there has been an obsession with financial measures of performance that have led to financial methods of management; this framework was intended to address that gap. The theory of the BSC was based on the concept of Information Economics introduced by the work of Parker and Benson (1987). It was applied

practically in the area of IT evaluation in research carried out by Grembergen and Bruggen (2000). The Balanced Scorecard (BSC) is now being implemented in part by SMEs (Anderson and Lawrie, 2001) as in its original form the extensive measures called for are superfluous and seen as unnecessary in SMEs where the smaller management structure facilitates easier communication. What the BSC gives SMEs is the strategic stance that they lack. Many researchers have begun to realise that there is no simple link between IT and business performance. It has been identified that most benefits are distilled through operational process indicators (Lillrank et. al., 2001) and therefore it is advantageous to measure IT in its operational terms and to identify the link between operational and financial benefits.

Levy et. al (1998) offer a framework which is not a classical evaluation framework but one used to classify SMEs according to their use of IT/IS and thus predict the impact that the IT/IS will have on the business. The matrix has an efficiency quadrant which focuses on the financial control of the business and no integration with business strategy; a co-ordination quadrant which focuses on improving customer care through cross-functional databases; a collaboration quadrant which shows an increased sophistication of IT/IS use and the use of EDI and email to communicate with customers and where often the IS will be part of business strategy and finally the innovation quadrant where the complete integration of business strategy with IS strategy is seen. Changes to business processes and people skills are seen as an integral part of this. This framework is included here as there are so few models intended specifically for SMEs. The matrix is deliberately simple in its approach to reflect the reduced complexity of the SME situation. Levy et al's (1998) broad-brush approach to categorisation of the IS/IT used is useful to show the focus within the organisation and assumptions may be made about the perceived value of IT as well as the actual value placed upon it by the organisation. It is also possible to show the maturity of the organisation in their use of IT. This would then show the SME by inference the degree of effort that may need to be extolled to implement any new system. E.g. the more sophisticated the type of IS the more effort in skills and knowledge is needed, the more planning for its use, etc. As organisations in the innovation quadrant need to have made huge changes in their business processes and skill set in order to achieve the integration suggested. Levy et al's (1998) research with 26 companies showed that only one SME fell into the innovation quadrant of their matrix. Most SMEs are looking to reduce costs but many are beginning to investigate adding value and in this context the framework is useful to the SME in also highlighting their motivation and raising awareness. Farbey et al's (1999) Benefits Evaluation Ladder work acknowledges that not only is it not always possible to measure costs and benefits but there are varying levels to which the costs and benefits will be realised. Farbey et.al. (1999) state that classifying "the use" of IT may be of fundamental importance in selecting suitable evaluation methods. The initial focus on operational efficiency that an organisation has is relatively simple to evaluate in comparison with the focus on strategic issues that are the sign of more mature IT users. One of the features of this type of framework is that they increase understanding and awareness; very few are frameworks for action. Most frameworks also have a time element and it is expected that organisations will follow the ascent through the framework over a period of time. However, most SMEs are attempting to take the leap to a higher point straight from their first implementation of IT, particularly those buying applications that have the capability of combining back office transaction processing with the front office desk top and reporting capabilities of quite complex Management Information Systems (MIS). Farbey et. al. (1999) offers a valid starting point for evaluation in SMEs with the use of this framework. It will not only allow them to see where they are from the point of view of evolutionary position, but also to look at where they would like to be, which is the starting point of strategic planning as defined by Ward (1996). This framework will introduce that concept to them and give a purpose to their IT implementation and help with the choice of evaluation method. It has been cited that the reason for the success or failure of an IT project is the poor quality of an organisation's decision-making process (Farbey et. al., 1993). If proper evaluation is not carried out then the result can be less effective decision making, as the results of the evaluation should inform the decisions. Often organisations blame everything else except the actual decision that was originally made. In using this framework SMEs can at once see the 'riskiness' of the project they may be undertaking and assess the benefits possible in light of this.

4. Summary of frameworks

Categorisation of the framework was a logical process as it has been identified that categorisation is the most usual approach to research in the study of social science type problems (Tsoukas, 1994).

Table 1 shows a summary of the categorisations proposed by this paper and suggests the primary and secondary focus for each.

Table 1 Summary of the categorisations

Category Framework	Technology	People Issues	Management Aspects	Evolutionary Position
Farbey Structure in Fives		X	O	
Seddon IS Effectiveness Matrix	O	X		
Delone and McLean Information Systems success Model	X			
Porter Value Chain Analysis			X	
Kaplan and Norton Balanced Scorecard		O	X	
Levy Analytical Framework				X
Farbey Benefits Evaluation Ladder			O	X

X = primary focus O = secondary focus

When a SME has decided on the overall focus for an investment then this may indicate the evaluation model that may be of potential use. Although in some cases an organisation may be better served by using a combination of frameworks depending upon the measurement sought. An example of this may be a company who want to ensure that they are moving to a higher evolutionary position but also realise the benefit of an approach that includes financial measures and customer satisfaction. In this overly simplistic demonstration the company might use both the Kaplan and Norton approach along with Levy's analysis. However, a significant amount of awareness raising is still necessary before many of these frameworks can be transferred. Researchers need to be developing effective and appropriate methods now and guiding SMEs in their use. Most SMEs purchase IT for short-term reasons although many of us would interpret those reasons as strategic. SMEs do not recognise the reasoning of strategy, neither do they recognise the detrimental effect an unsuccessful purchase may have on their business. Most feel that purchasing IT is a necessary evil. A pilot survey conducted by the authors during 2006 with 15 SMEs revealed some surprising facts that support the need to help SMEs understand the need to evaluate. In the survey SMEs were asked what their last 3 IT purchases were and the reason for those purchases. The 43 purchases documented were grouped as follows:

- Replacement for current IT: 7
- New employee requirements: 7
- Mobile working: 9
- Increased capacity: 4
- Needed to fulfil contract 6
- Extra Functionality: 5
- Other: 5

Excepting category 1 and 2 all other categories could be viewed as strategic reasoning. When asked if the purchase had been successful for the business 33% said very successful, 61% said successful and 6% said no change. None of the surveyed companies said that the purchase had not been successful. Yet when asked if they had measured that success only one company had conducted any kind of evaluation by measuring Return on Investment (ROI). The majority felt that it was not necessary, Company A commented:

> *"The user's good reaction and the low cost meant we did not feel it necessary"*

However, Company A had not purchased their IT for a strategic reason but for a new employee requirement. Company B had purchased a web server, a significant investment for a small company they stated their reason for purchasing was as a marketing investment which is a strategic reason. Stating that the purchase had been successful yet they acknowledged having no plans to evaluate that purchase. When asked about how they would know it was a successful purchase they stated:

> *"We will only know when we have recovered costs through new orders"*

With no plans in place to measure this it may prove very difficult for the company to do so. Most companies in this study were unaware of any evaluation methods or models other than ROI. Having a categorisation of the available frameworks and being able to mix and match those frameworks would go a long way towards helping these SMEs.

5. Conclusion

There are a plethora of IT evaluation frameworks available for business. However, there is no one model that can claim to cover all of the necessary variables. SMEs form an important part of the

majority of supply chains and many are highly dependent upon technology to remain their customers' preferred supplier (Costello and Reece, 2005). Therefore a short analysis and appraisal of some of the more popular evaluation frameworks is presented here in an attempt to assess their usefulness to SMEs. This approach is proposed as a pre-cursor to further debate on the usefulness of categorisation of existing frameworks. Furthermore, there is a need for empirical evidence to support this view. It is suggested here that it is possible to use existing frameworks alone or in combination. An organisation would need to decide on their priorities and then selects the framework that is most applicable to their priorities in order to determine the most appropriate measurement.

Although the field of IT evaluation is vast there are still many calls for more research and after twenty years there is still no definitive answer to many of the questions posed or indeed an effective, all-encompassing framework for IT evaluation. This paper again confirms that there can be no unique way of measuring the value from IT but it will depend upon the focus that an organisation perceives is their 'value'. This emphasis will also change as the organisation progresses within the evolutionary lifecycle. This may mean that the search for a particular framework or the amalgamation of existing ones may not be appropriate or achievable. However, if the organisation first decides its priorities and selects appropriate frameworks (or parts of) the value of the IT evaluation approach may be recognised

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